Alexander Radovic | Curriculum Vitae

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Education and Employment

2013 - Ongoing	Postdoctural Researcher College of William and Mary, Department of Physics
2010 - 2013	PhD in High Energy Particle Physics University College London, Department of Physics and Astronomy PhD Thesis: Measuring Neutrino Oscillations using the MINOS Experiment Advisor: Prof. Jenny Thomas
2006 - 2010	MSci Theoretical Physics, First Class Honors University College London, Department of Physics and Astronomy MSci Thesis: Modelling the Highest Energy Collisions in the World: Energy Flows and Jet Production Advisor: Prof. Jonathan Butterworth

Research Experience

- (2013-Ongoing): Key researcher in the NOvA Appeared electron neutrino search. *Worked to bring the tools of the deep learning and computer vision community to the NOvA experiment, with a particular focus on the identification of ν_e charge current interactions using convolutional neural networks. Produced numerous studies of data-simulation agreement using the NOvA Near and far Detectors. Highly involved in data driven cross checks of signal-like samples in the NOvA Near and Far detectors.*
- (2013-Ongoing): Convened beam systematics groups in both the NOvA and MINOS collaborations, worked to study hadron production uncertainties for the first NOvA analyses and the MINOS sterile analysis, produced the first NOvA ND calibrations, created tools to study calibration uncertainties at NOvA, and maintained the NOvA timing delay system. *Created a novel technique for the NOvA first analyses and the MINOS Sterile neutrino analysis which uses fixed target data and simulation disagreement in hadron production to produce a covariance matrix describing the uncertainty on our simulation of the NuMI beam. Produced the first NOvA ND attenuation calibrations and made a tool to produce deliberate miscalibrations in the NOvA detectors for systematic studies. Worked with the NOvA DAQ group as an on call expert to maintain the NOvA detectors timing systems.*
- (2012-2013): Lead Researcher on two and three flavour NuMI Beam Muon Neutrino Disappearance studies at MINOS. *Produced the updated MINOS beam muon neutrino disappearance measurement of $\sin^2(2\theta_{23})$ and $\Delta|m^2_{atm}|$ first shown at Neutrino 2012. This measurement was used as part of the full MINOS beam and atmospheric neutrino disappearance analysis to give*

the worlds leading measurement of $\Delta|m^2_{atm}|$, also first shown at Neutrino 2012. As part of this analysis role I have also been heavily involved in the MINOS disappearance analysis PRD, which is currently aiming for publication this summer.

- (2012-2013): Produced a series of maps of neutrino event and flux maps in the NuMI beam for the NuMI Exploitation Working Group. *Produced a tool for generating both oscillated and unoscillated neutrino event spectra and flux in the NuMI beam for any set of GPS coordinates and height above sea level. Extended this same tool to create maps of neutrino event rates and flux in the area covered by the NuMI beam.*
- (2010-2011): Heavily involved in the 2011 anti-neutrino analysis at MINOS, began data quality monitoring and beam flux MC production service tasks for the MINOS collaboration. *Carried out numerous background, reconstruction and systematic studies in preparation for the box opening. Became familiar with the FLUGG MC package and developed a framework for MINOS beam flux file production using the fermilab computing grid. Took over the task of monitoring the MINOS data quality by making data validation plots for all MINOS analysis groups that use NuMI beam data.*
- (2009-2010): Tested the Herwig++ MC and developed the rivet analysis packages for the ATLAS collaboration. *Produced collider fake data using the Herwig++ event generator as well as wrote and implemented several jet shape variable measuring tools for the rivet analysis package.*
- (Summer 2009): Developed the ANITA detector MC. *Carried out an optimisation study of antenna settup for an ARA style experiment, and implemented a simple way to change the antenna set up in the ANITA MC.*

Presentations

- Poster: *CVN A Convolutional Visual Network for Identification and Reconstruction of NOvA Events* Neutrino 2016, 4-9 July 2016, London UK.
- Poster: *Charge Current Electron Neutrino Event Identification in the NOvA Detectors* Neutrino 2016, 4-9 July 2016, London UK.
- Presentation: *Deep Learning With art for NOvA* Art Users Meeting, June 17th 2016, Chicago USA.
- Presentation: *First Results from the NOvA Experiment* SESAPS 2015, November 18-21 2015, Mobile USA.
- Presentation: *Studying Neutrino Oscillations at the NOvA Experiment* WM Colloquim, November 3rd, Williamsburg USA.
- Presentation: *NOvA Status and Future* CIPANP 2015, May 19-24 2015, Vail USA.
- Presentation: *NuMI Neutrino Flux Predictions* Neutrino Beams and Instrumentation 2014, Sepetember 23-26 2014, Chicago USA.
- Presentation: *Like to Like Extrapolation in the NuMI Beam* LBNE ND Workshop, July 28-31 2015, Chicago USA.
- Poster: *Beam Flux Fits and Systematics in MINOS+* Neutrino 2014, The XXVI International Conference on Neutrino Physics and Astrophysics, June 2-7 2014, Boston, USA.
- Poster: *NuMI-X: An Inter-Collaboration NuMI Beam Working Group.* Neutrino 2014, The XXVI International Conference on Neutrino Physics and Astrophysics, June 2-7 2014, Boston, USA.
- Presentation: *Measuring Neutrino Oscillations with the MINOS Experiment,* DPF 2013, Meeting of the American Physical Society(APS) Division of Particles and Fields(DPF), August 13-17 2013, Santa Cruz, USA.
- Presentation: *Recent Results From MINOS and Future Plans For MINOS+* Fermilab Users

Meeting 2013, The 46th Annual Fermilab Users Meeting, June 12-3 2013, Chicago, USA.
- Poster: *Measuring Neutrino Oscillations with the MINOS Experiment,* Neutrino 2012, The XXV International Conference on Neutrino Physics and Astrophysics, June 2-9 2012, Kyoto, Japan.

Workshops and Summer Schools

- Neutrino Beams and Instrumentation Workshop, Sept 16-19 2014, Fermilab, USA
- Viet Nus 2012 Workshop, The 8^{th} Recontres du Vietnam, Dec 17-22 2012, Qui Nhon, Vietnam
- RAL HEP Summer School 2011, Sept 12-23 2011, Somerville College, Oxford

Outreach

- Young NOvA President (2015-2016). *One of two elected representatives of graduate students and postdocs working on the NOvA experiment.*
- NOvA Speakers Commitee Member (2014-2016). *Representative of graduate students and postdoc interests within the NOvA speakers commitee.*
- Officer of the Fermilab Graduate Student Association (2011-2012). *One of four elected representatives of graduate students based at Fermilab. Organised the New Perspectives conference and poster session, visited washington as part of an office of science initiative to raise awareness of High Energy Particle physics amongst members of congress, and worked with the Users Executive committee and Fermilab Directorate to found the Fermilab Student and Postdoc Association.*
- Young MINOS representative to the MINOS Insitutional Board (2011-2012). *One of two elected representatives of graduate students and postdocs working on the MINOS experiment. Represented the interests of young MINOS at MINOS Instutional Board meetings.*

Job Skills

- Programming Languages: ROOT, C++, Java, Python, Perl, Fortran, linux shell scripts
- Monte Carlo Generators: FLUGG, FLUKA, Geant4, Herwig++

Publications

P. Adamson et al. [Daya Bay and MINOS Collaborations], "Limits on Active to Sterile Neutrino Oscillations from Disappearance Searches in the MINOS, Daya Bay, and Bugey-3 Experiments," [arXiv:1607.01177 [hep-ex]].

P. Adamson et al. [MINOS Collaboration], "A search for sterile neutrinos mixing with muon neutrinos in MINOS," arXiv:1607.01176 [hep-ex].

P. Adamson et al. [MINOS Collaboration], "A search for flavor-changing non-standard neutrino interactions using ν_e appearance in MINOS," arXiv:1605.06169 [hep-ex].

P. Adamson et al. [MINOS Collaboration], "Search for Time-Independent Lorentz Violation using Muon Neutrino to Muon Antineutrino Transitions in MINOS," arXiv:1605.03146 [hep-ex].

A. Aurisano et al., "A Convolutional Neural Network Neutrino Event Classifier," [arXiv:1604.01444 [hep-ex]].

P. Adamson et al. [MINOS Collaboration], "Measurement of the Multiple-Muon Charge Ratio in the MINOS Far Detector," Phys. Rev. D 93, no. 5, 052017 (2016) doi:10.1103/PhysRevD.93.052017 [arXiv:1602.00783 [hep-ex]].

R. Acciarri et al. [DUNE Collaboration], "Long-Baseline Neutrino Facility (LBNF) and Deep Underground Neutrino Experiment (DUNE) : Volume 1: The LBNF and DUNE Projects," arXiv:1601.05471 [physics.ins-det].

P. Adamson et al. [NOvA Collaboration], "First measurement of muon-neutrino disappearance in NOvA," Phys. Rev. D 93, no. 5, 051104 (2016) doi:10.1103/PhysRevD.93.051104 [arXiv:1601.05037 [hep-ex]].

P. Adamson et al. [NOvA Collaboration], "First measurement of electron neutrino appearance in NOvA," Phys. Rev. Lett. 116, no. 15, 151806 (2016) doi:10.1103/PhysRevLett.116.151806 [arXiv:1601.05022 [hep-ex]].

R. Acciarri et al. [DUNE Collaboration], "Long-Baseline Neutrino Facility (LBNF) and Deep Underground Neutrino Experiment (DUNE) : Volume 4 The DUNE Detectors at LBNF," arXiv:1601.02984 [physics.ins-det].

R. Acciarri et al. [DUNE Collaboration], "Long-Baseline Neutrino Facility (LBNF) and Deep Underground Neutrino Experiment (DUNE) : Volume 2: The Physics Program for DUNE at LBNF," arXiv:1512.06148 [physics.ins-det].

P. Adamson et al., "The NuMI Neutrino Beam," Nucl. Instrum. Meth. A 806, 279 (2016) doi:10.1016/j.nima.2015.08.063 [arXiv:1507.06690 [physics.acc-ph]].

P. Adamson et al. [MINOS Collaboration], "Precision measurement of the speed of propagation of neutrinos using the MINOS detectors," Phys. Rev. D 92, no. 5, 052005 (2015) doi:10.1103/PhysRevD.92.052005 [arXiv:1507.04328 [hep-ex]].

P. Adamson et al. [MINOS Collaboration], "Observation of Seasonal Variation of Atmospheric Multiple-Muon Events in the MINOS Near and Far Detectors," Phys. Rev. D 91, no. 11, 112006 (2015) doi:10.1103/PhysRevD.91.112006 [arXiv:1503.09104 [hep-ex]].

P. Adamson et al. [MINOS Collaboration], "Study of quasielastic scattering using charged-current -iron interactions in the MINOS near detector," Phys. Rev. D 91, no. 1, 012005 (2015) doi:10.1103/PhysRevD.91.012005 [arXiv:1410.8613 [hep-ex]].

P. Adamson et al., "Observation of muon intensity variations by season with the MINOS Near Detector," Phys. Rev. D 90, no. 1, 012010 (2014) doi:10.1103/PhysRevD.90.012010 [arXiv:1406.7019 [hep-ex]].

P. Adamson et al. [MINOS Collaboration], "Combined analysis of ν_μ disappearance and $\nu_\mu \to \nu_e$ appearance in MINOS using accelerator and atmospheric neutrinos," Phys. Rev. Lett. 112, 191801 (2014) doi:10.1103/PhysRevLett.112.191801 [arXiv:1403.0867 [hep-ex]].

P. Adamson, J. A. B. Coelho, G. S. Davies, J. J. Evans, P. Guzowski, A. Habig, J. Hartnell and A. Holin et al., "CHerenkov detectors In mine PitS (CHIPS) Letter of Intent to FNAL," arXiv:1307.5918 [physics.ins-det].

P. Adamson et al. [MINOS Collaboration], "Measurement of Neutrino and Antineutrino Oscillations Using Beam and Atmospheric Data in MINOS," Phys. Rev. Lett. 110, 251801 (2013) [arXiv:1304.6335 [hep-ex]].

P. Adamson *et al.* [MINOS Collaboration], "A search for flavor-changing non-standard neutrino interactions by MINOS," [arXiv:1303.5314 [hep-ex]].

P. Adamson et al. [MINOS Collaboration], "Electron neutrino and antineutrino appearance in the full MINOS data sample," Phys. Rev. Lett. 110, 171801 (2013) [arXiv:1301.4581 [hep-ex]].

P. Adamson *et al.* [The MINOS Collaboration], 'Comparisons of annual modulations in MINOS with the event rate modulation in CoGeNT," [arXiv:1212.1776 [hep-ex]].

P. Adamson *et al.* [The MINOS Collaboration], "Measurements of atmospheric neutrinos and antineutrinos in the MINOS Far Detector," Phys. Rev. D **86**, 052007 (2012) [arXiv:1208.2915 [hep-ex]].

P. Adamson *et al.* [The MINOS Collaboration], "Measurements of atmospheric neutrinos and antineutrinos in the MINOS Far Detector," Phys. Rev. D **86**, 052007 (2012) [arXiv:1208.2915 [hep-ex]].

P. Adamson *et al.* [The MINOS Collaboration], "An improved measurement of muon antineutrino disappearance in MINOS," Phys. Rev. Lett. **108**, 191801 (2012) [arXiv:1202.2772 [hep-ex]].